

an excitation source for directing electromagnetic radiation to a surface of said substrate so as to induce a wave therein in a region of an at least partially buried substrate alignment mark; and

a measurement system to direct a measurement beam to be reflected by said surface and to detect surface effects caused by said wave thereby to perform an alignment to said substrate alignment mark,

wherein said excitation source is a laser constructed and arranged to emit pulses shorter than 1 nanosecond to induce an acoustic wave in at least one covering layer obscuring said substrate alignment mark.

7. (Amended) A lithographic projection apparatus comprising:

a radiation system constructed and arranged to supply a projection beam of radiation;

a support structure constructed and arranged to support beam patterning structure, the beam patterning structure serving to pattern the projection beam according to a desired pattern;

a substrate table constructed and arranged to hold a substrate;

a projection system constructed and arranged to project the patterned beam onto a target portion of the substrate; and

an alignment system to align the substrate to the beam patterning structure, said alignment system comprising:

an excitation source for directing electromagnetic radiation to a surface of said substrate so as to induce a wave therein in a region of an at least partially buried substrate alignment mark; and

a measurement system to direct a measurement beam to be reflected by said surface and to detect surface effects caused by said wave thereby to perform an alignment to said substrate alignment mark,

wherein said excitation source is a modulated continuous wave source which is constructed and arranged to emit a harmonically varying beam of radiation so as to induce a thermal wave in the at least one covering layer obscuring said substrate alignment mark.

See the attached Appendix for the changes made to effect the above claim(s)

Please add the following new claims:

18. (New) A lithographic projection apparatus comprising:
a radiation system constructed and arranged to supply a projection beam of radiation;
a support structure constructed and arranged to support beam patterning structure,
the beam patterning structure serving to pattern the projection beam according to a desired
pattern;
a substrate table constructed and arranged to hold a substrate;
a projection system constructed and arranged to project the patterned beam onto a
target portion of the substrate; and
an alignment system to align the substrate to the beam patterning structure,
said alignment system comprising:
an excitation source for directing electromagnetic radiation to a surface of said
substrate so as to induce a wave therein in a region of an at least partially buried substrate
alignment mark; and
a measurement system to direct a measurement beam to be reflected by said surface
and to detect surface effects caused by said wave thereby to perform an alignment to said
substrate alignment mark,
wherein said at least partially buried substrate alignment mark is buried in a process
layer.
19. (New) A lithographic projection apparatus according to claim 18,
wherein said process layer comprises at least one of a conductor layer and a
dielectric layer of a circuit pattern.
20. (New) A lithographic projection apparatus according to claim 18,
wherein said process layer comprises a plurality of process layers.
-